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# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

## Improved Bearing Lubricating System

I, PIERRE HENRY GALLAY, a French citizen of 11 bis rue Jean Mermoz, Paris 8°, France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to bearing arrangements of the kind wherein a shaft rotates in a sleeve and is lubricated therein by a lubricant fed to the interface from a groove in the shaft. The invention is particularly applicable to compressor units for refrigerators.

Compressor units for refrigerators generally comprise an electric motor, the shaft of which directly drives a compressor piston valve mounted in the same housing as the motor. An oil bath is generally provided at the bottom of the housing, which bath has a lubrication system drawing oil from the bath for supply to the appropriate components. In apparatus where the driving shaft is vertically disposed, the lubrication system generally comprises a groove or conduit (for example, a helical groove) which is formed in or on the shaft and which serves to feed the oil to the points to be lubricated. The end of the groove is fed with oil from the bath by a system employing centrifugal force.

The present invention aims to provide an improved arrangement of this type which is characterised by its simplicity, solidity in construction and efficacy in use.

According to the invention a bearing arrangement of the kind wherein a shaft rotates in a sleeve is lubricated by a lubricant fed to the interface from a groove in the shaft to which lubricant passes from a sump at the end of the shaft through a lubricant supply passage which extends generally longitudinally of the shaft from the sump to the end of the oil groove, which passage is at least partly in the shaft and inclined from the groove towards the shaft axis, and in which a separation passage extends generally radially from the junction of the supply passage and the groove to the axis of the shaft where it communicates with a further passage extending generally lengthwise of the shaft to a point outside the sleeve and off the shaft axis but above the level of the sump.

Generally the shaft will be vertical and the separation passage slightly inclined relatively to horizontal, rising towards the axis of the shaft.

In a typical construction according to the invention the supply passage comprises a passage within the shaft itself which is extended to the sump by a tube which intersects the shaft axis inside the sump and the outlet passage terminates in the end surface of the shaft.

Preferably all the passages are rectilinear.

The arrangement has the advantages that its construction is very simple, because it is reduced to comprise three suitably disposed passages and a tube element and there is no assembly or any element capable of displacement or deterioration due to wear during operation. Thus, the arrangement is particularly simple, economical and reliable in operation.

The emulsion of oil and gas which ascends through the supply tube and the second passage is progressively degasified in the second passage. The separation of the oil and the gas is effected in the first passage under the action of centrifugal force, and the compressed gas moves towards the axis, from whence it is discharged through the third passage, again under the action of centrifugal force. This degasification is of great importance to the lubrication system if it is to function properly. The efficacy of this degasification is further improved by inclining the first passage relatively to the horizontal

because the oil will not only separate from the gas by centrifugal force, but also by the force of gravity.

The invention is illustrated by the accompanying drawing which is a diagrammatic axial section of a refrigerator compressor unit embodying the invention.

An electric motor 2 is mounted in the housing 1, the shaft 3 of the motor directly driving by means of its crank pin 4, a sliding block 5 which block in turn drives a piston (not shown) in the quideway 6.

An oil bath 7 is provided at the bottom of the housing 1.

The oil is supplied by a lubrication system which, in the arrangement according to the invention, feeds the oil into the groove 8, lubricating the central bearing 9, and from there into the crank pin and piston assembly by way of groove 8, at the same time the oil is fed by way of groove 8 to abutment 9. Any excess oil flows out at the upper end of groove 8 and is then atomised between the walls of the housing, where it is cooled before re-entering the oil bath.

In the arrangements according to the invention the system comprises the assembly of three passages 10, 11 and 12 carried by the end of the groove 8 to the axis 14 of the shaft, this passage being preferably slightly inclined relatively to the horizontal, rising from the groove 8 on the axis 14. A supply passage 11 starts from the edge of the passage 10, and extends downwardly, the said passage 11 being extended by a tube 13 open at its bottom end 15 and intersecting the axis 14 at a point below the oil level 15. A third passage 12 starts from the inner axial zone of the passage 10 and terminates at the surface of the shaft, for example at its bottom surface, at a point spaced from the axis 14.

In operation, when the shaft 3 rotates, it also rotates the tube 13 and the rotation of the tube causes the oil to rise in it. On entering the passage 10, the oil is degasified because the gases are seperated from the emulsion to flow towards the centre of the shaft whereas the oil is centrifuged towards the groove 8, from whence it escapes to lubricate the various assemblies, as described above.

The groove 8 need not necessarily be helical.

WHAT I CLAIM IS:—

1. A bearing arrangement of the kind wherein a shaft rotates in a sleeve and is lubricated therein by a lubricant fed to the interface from a groove in the shaft to which lubricant passes from a sump at the end of the shaft through a lubricant supply passage which extends generally longitudinally of the shaft from the sump to the end of the oil groove, which passage is at least partly in the shaft and inclined from the groove towards the shaft axis, and in which a separation passage extends generally radially from the junction of the supply passage and the groove to the axis of the shaft where it communicates with a further passage extending generally lengthwise of the shaft to a point outside the sleeve and off the shaft axis but above the level of the sump.

2. An arrangement according to claim 1 in which the shaft is vertical.

3. An arrangement according to claim 2 in which the separation passage is slightly inclined relatively to the horizontal and rises towards the shaft axis.

4. An arrangement according to any preceding claim in which the supply passage comprises a passage in the shaft itself which is extended to the sump by a tube which intersects the shaft axis inside the sump and in which the open end of outlet passage terminates in the end surface of the shaft.

5. An arrangement according to any preceding claim in which all the passages are rectilinear.

6. A compressor unit for refrigerators having a shaft and sleeve bearing arrangement according to any preceding claim.

7. A compressor unit according to claim 6 having a housing containing an electric motor, the shaft of which drives a compressor piston valve also within the housing.

8. A compressor unit for refrigerators substantially as described herein with reference to the accompanying drawing.

9. A bearing unit of the kind wherein a shaft rotates in a sleeve and is lubricated therein by a lubricant fed to the interface from a groove in the shaft substantially as described herein with reference to the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*